

Plans for LHC Instrumentation at LBNL

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Outline

- Task sheets and plans for the three systems
- Short term plans
- Cost considerations
- Conclusions



Lumi Task Sheet

We plan to complete the testing and qualification of a prototype luminometer.

The goal of the tests is to demonstrate the 40 Mhz response with required accuracy and position sensitivity.

We plan for two series of tests. The first will measure the position sensitivity and impulse response of the detector as a function of gas pressure, type, and voltage. These tests will be performed in the ALS BTS beamline where 1 Hz pulses of electrons with number intensities ranging from 1-10e9 are available.

The second tests will pulse the detector with ~ 40 MHz electrons. One possibility is to test this in the ALS storage ring using ejected electrons from a ~ 40 MHz bunch structure. We will explore alternative sources and arrange an experimental test if necessary.

We will also begin engineering design of a second prototype detector.



LUMI Plans

FY04

- Continue performance tests
 - Complete 40 MHz test and optimization
- Start production engineering study

FY 05

- Complete mechanical fabrication details
- Integrate test stand with standard CERN DAQ system
- Integration into TAN
- Continue performance tests and electronics integration - test at FNAL/RHIC?
- Radiation damage assessment

FY06

- Fabrication of 4 units + spares
- Fabrication of auxiliary hardware (install and remove gear)
- Device tests, electronics integration and performance qualification

FY07

- Transfer to CERN
- Installation support
- Commissioning support

FY08

- Post-commissioning and pre-operations support



LDM/AGM Task Sheet

Our main goal is to produce a study of techniques for monitoring the LHC abort gap. The study will provide recommendations of feasible technologies for providing a triggerable signal if the charge in the abort gap exceeds LHC specifications. The study will be a combination of calculations, simulations, and experimental tests.

The deliverable is a white paper study summarizing the above results. Intermediate milestones include a meeting with members of the CERN instrumentation group in early 2004 to set the parameters of the study. We will develop a plan for experimental tests of abort gap monitoring using synchrotron light comparing APD and gated MCP/PMT technology.

Our secondary goal is to complete the proof-of-principle study of the optical sampling system demonstrated over the last two years, supported by LBNL LDRD funding, and to begin an engineering design for such a system for use at the LHC.

In particular, we want to specify the laser needed. We will summarize the initial studying a report describing the measured performance and its application to LHC.



LDM Plans

FY04

No funding!

FY05

Define application to CERN specification and requirements

Systems requirements and conceptual design

Engineering R&D - prototypes

FY 06

Production/procurement

Custom engineering

Integration with CERN DAQ systems

FY07

Transfer to CERN

Installation support

Commissioning support

FY08

Post-commissioning and pre-operations support



AGM Plans

FY04

Feasibility study
Conceptual design

FY05-08

TBD

Nearly impossible to predict until a feasibility and conceptual design is complete



Short Term Activities

- Ongoing FY04 activities
 - Lumi
 - Complete fast studies
 - AGM
 - Feasibility study and technology scouting
- Write white papers and document FY04 results
- Initial contacts with CERN for DAQ integration
- LARP definition of FY05 scope for all instruments
- FY05 activities as described above
 - Pending DoE/LARP approval and funding



Budgetary Considerations

- Overall budget for Lumi and LDM completed prior 2002
 - 5 level WBS structure
 - Presented at previous collaboration meetings
 - Costs include design, fabrication, documentation, transfer, installation, commissioning and pre-operations support: some of these costs may be double counted in Hardware Commissioning and Beam Commissioning budgets.
 - Spending profiles need to be reviewed and adjusted to better match the existing project schedule, installation and commissioning plans.
- AGM is a new device
 - Full cost estimate possible after completion of feasibility study
- Once the funding process is defined, we can provide a budgetary request for FY05 funding



Budget Summary

Cost guidelines from FY04 task sheets

Device/FY	04	05	06
In FY04 \$1,000s			
LUMI	203	450	950
LDM	0	198	697
AGM	80	TBD	

* LDM+AGM request was 500 and 1000 combined



Conclusions

- We are on track to deliver what we promised in the task sheets
- The project planning for the necessary instrumentation to provide luminosity and longitudinal density measurements was completed in 2002
 - Some revisions might be necessary to better fit the current LHC project schedule
- The additional scope for the deployment of an abort monitoring system will be estimated once the initial study is completed
- Funding-to-date has been (marginally) adequate
 - Supplemented by LBNL institutional support (both money and people)
- Year-by-year funding cycle at DoE contributes to risk



Conclusions (cont.)

- LBNL is committed to deliver and support Lumi and LDM devices through LHC commissioning and initial operations
 - We are ready to deliver and support an Abort Gap Monitoring system if it is included within the scope of the collaboration.

